Find the points of inflection and discuss the concavity of the graph of the function.

5. $f(x) = 2x^4 - 8x + 1$

$f'(x) = 8x^3 - 8$

$f''(x) = 24x^2$

$0 = 24x^2$

$0 = x^2$

$x = 0$

$f''(x)$: + (Test -1) | 0 | + (Test 1)

Concave Up:

$(-\infty, 0) \cup (0, \infty)$

No Point of Inflection

6. $f(x) = x\sqrt{9-x} = x(9-x)^{\frac{1}{2}}$

$f'(x) = x\left(\frac{1}{2}(9-x)^{-\frac{1}{2}} \cdot (-1)\right) + 1(9-x)^{1/2}$

$= \frac{-x}{2(9-x)^{1/2}} + \frac{(9-x)^{\frac{1}{2}}}{1}$

$= \frac{-x}{2(9-x)^{1/2}} + \frac{2(9-x)}{2(9-x)^{1/2}} = \frac{18-3x}{2(9-x)^{1/2}} = f'(x)$

$f''(x) = \frac{2(9-x)^{1/2} \cdot (-3) - (18-3x)(9-x)^{-1/2}(-1)}{\left(2(9-x)^{1/2}\right)^2}$

$= \frac{-6(9-x)^{1/2} - \frac{-18+3x}{(9-x)^{1/2}}}{4(9-x)}$

$= \frac{-6\sqrt{9-x} + \frac{18-3x}{\sqrt{9-x}}}{4(9-x)}$

$= \frac{\frac{-6(9-x)}{\sqrt{9-x}} + \frac{18-3x}{\sqrt{9-x}}}{4(9-x)}$

$\sqrt{9-x} = (9-x)^{\frac{1}{2}}$

$(9-x)^{\frac{1}{2}} \cdot (9-x)^1$

$= \frac{\frac{-54+6x+18-3x}{\sqrt{9-x}}}{4(9-x)}$

$= \frac{-36+3x}{\sqrt{9-x}} \cdot \frac{1}{4(9-x)}$

$= \boxed{\frac{-36+3x}{4(9-x)^{3/2}}} = f''(x)$

$-36 + 3x = 0$

$\frac{3x}{3} = \frac{36}{3}$

$x = 12$

Look @ $f(x)$

$x \neq 12$

$x \leq 9$

b/c $\sqrt{9-x}$

$4(9-x)^{3/2} = 0$

$(9-x)^{3/2} = 0$

$9 - x = 0$

$9 = x$

$-$ (Test 0) | 9

$\frac{-36+3(0)}{4(9-0)^{3/2}} = \frac{-36}{108}$

Concave down:

$(-\infty, 9)$

No POI